## Space Weather Forecast

Issued on Thursday, 15 December 2022 at 01:16 Local

**This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales**

**Space Weather Forecast Headline: Further Moderate flares (R1-R2 Blackouts) likely from the Active sunspot in the southwest.**

**Analysis of Space Weather Activity over past 24 hours**

**Solar Activity:** Solar Activity is Moderate with 8 Moderate class flares (7 R1 Blackouts and 1 R2 Blackout) observed in the last 24 hours from a small, but magnetically complex and therefore active sunspot region in the southwest disc. A further 2 Moderate flares were also observed from the large sunspot in the far southwest as it rotated off the Earth-facing disc, and over the limb to no longer be visible. There are a total of nine sunspots on the visible disc, with other notable but inactive regions including a moderately sized spot in the southeast. The other regions are smaller and simpler. No Earth-directed coronal mass ejections (CMEs) have been observed. A filament (line of plasma held together by the Suns magnetic field) lifted off near the southeast of the disc at 14/0300 UTC has analysed as likely passing south of the Earth, but with a very slight chance of glancing interaction on the 18th.

**Solar Wind / Geomagnetic Activity:** Solar wind speeds have been at background levels throughout around 340-380 km/s. The Interplanetary Magnetic field was weak but did show a rotation from weakly positive (northward) values to weakly negative (southward). Geomagnetic activity remained Quiet however.

**Energetic Particles / Solar Radiation:** The count rate of energetic particles (high energy protons) has persisted at background with no solar radiation storms observed.

**Four-Day Space Weather Forecast Summary**

**Solar Activity:** Solar activity is likely to be Moderate, especially day 1 (15th), with further Moderate -flares likely from the active sunspot in the southwest, There is a slight chance of rising to High with the potential for an isolated maximum Strong flare.

**Solar Wind / Geomagnetic Activity:** There are currently no Earth-directed CMEs. Although the missing CME from the 14th has a slight chance of giving a glancing interaction on day 4 (18th). Solar winds are expected to persist at Background to Slightly Elevated speeds until at least day 4 (18th), when the arrival of fast winds from a coronal hole could occur. Although the strength and timing of any enhancement is low confidence. Mainly Quiet geomagnetic activity is expected, but with a chance of increasing to Unsettled to Active intervals, with a slight chance of G1 Minor Storms day 4 (18th).

**Energetic Particles / Solar Radiation:** The count rate of energetic particles (high energy protons) is likely to persist at background, however this has a slight chance of rising in response to any notable flares that occur, giving a slight chance of approaching, and perhaps exceeding the S1/Minor Storm level.

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Met Office

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**Geomagnetic Storms:**

| Geo-Magnetic Storm Probability (Exceedance) | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Minor or Moderate | G1 to G2 | No | 1 | 1 | 1 | 20 |
| Strong | G3 | No | 1 | 1 | 1 | 1 |
| Severe | G4 | No | 1 | 1 | 1 | 1 |
| Extreme | G5 | No | 1 | 1 | 1 | 1 |

**Radio Blackouts - X Ray Flares:**

| X Ray Flares Probability | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Active | R1-R2 M Class | Yes | 70 | 50 | 40 | 40 |
| Very Active | R3 to R5 X | No | 15 | 10 | 5 | 5 |

**Solar Radiation Storms - (High Energy Protons):**

| Radiation Storms Probability (Exceedance) | Level ($cm^{-2}$ $sr^{-1}$ $s^{-1}$) | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Active | ≥ S1 | No | 10 | 10 | 5 | 5 |
| Very Active | ≥ S3 * | No | 1 | 1 | 1 | 1 |

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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